

Amendment and Response - Under 37 C.F.R. §1.116 - Expedited Examining Procedure      Page 2 of 9  
Serial No.: 09/865,612  
Confirmation No.: 4697  
Filed: May 25, 2001  
For: METHODS, COMPLEXES, AND SYSTEMS FOR FORMING METAL-CONTAINING FILMS ON SEMICONDUCTOR STRUCTURES

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

18. (Original) A chemical vapor deposition system comprising:

a deposition chamber having a substrate positioned therein;  
a vessel containing a precursor comprising one or more complexes of the formula:



wherein:

M is a group IVB, VB, or VIB metal;

each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> is independently H or an organic group;

L is selected from the group of CO, NO, CN, CS, CNR<sup>5</sup>, R<sup>6</sup>CN, or R<sup>7</sup>, wherein each R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> group is independently an organic group;

x = 1 to 4; and

y = 1 to 4; and

a source of inert carrier gas for transferring the precursor to the chemical vapor deposition chamber.

*↓ Not  
ERK  
(10/21/03)*

19. (Original) A chemical vapor deposition system comprising:

a deposition chamber having a substrate positioned therein;  
a vessel containing a precursor composition comprising one or more complexes of the formula:



wherein:

M is a Group IVB, VB, or VIB metal;

each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> is independently H or an organic group;

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each L is independently CO, NO, CN, CS, CNR<sup>5</sup>, R<sup>6</sup>CN, or R<sup>7</sup>, wherein each R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> group is independently an organic group;  
x = 1 to 4; and  
y = 1 to 4.

20. **(Currently Amended)** The system of claim 38[[19]] wherein the deposition chamber is adapted for forming a metal-containing film comprising vaporizing the precursor composition and directing it toward the semiconductor substrate or substrate assembly using a chemical vapor depositional technique.
21. **(Original)** The system of claim 20 wherein the chemical vapor deposition technique comprises flash vaporization, bubbling, microdroplet formation, or combinations thereof.
22. **(Original)** The system of claim 20 wherein the precursor composition is vaporized in the presence of a carrier gas.
23. **(Original)** The system of claim 20 wherein the precursor composition is vaporized in the presence of a reaction gas.
24. **(Original)** The system of claim 23 wherein the reaction gas is selected from the group of H<sub>2</sub>, SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>, NH<sub>3</sub>, N<sub>2</sub>H<sub>4</sub>, PH<sub>3</sub>, AsH<sub>3</sub>, GeH<sub>4</sub>, t-BuSbMe<sub>2</sub>, H<sub>2</sub>S, H<sub>2</sub>Se, Te(allyl)<sub>2</sub>, and combinations thereof.
25. **(Original)** The system of claim 19 wherein each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> group is independently H or a (C<sub>1</sub>-C<sub>30</sub>)organic group.
26. **(Original)** The system of claim 19 wherein the complex is a monomer.

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27. **(Original)** The system of claim 19 wherein each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> group is independently H or a (C<sub>1</sub>-C<sub>4</sub>)alkyl moiety.
28. **(Original)** The system of claim 19 wherein R<sup>7</sup> is cyclopentadienyl or a substituted cyclopentadienyl.
29. **(Original)** The system of claim 19 wherein the precursor composition is a liquid.
30. **(Original)** The system of claim 19 wherein the metal is a Group VB metal.
31. **(Original)** The system of claim 30 wherein the metal is vanadium.
32. **(Currently Amended)** The system of claim 20 [[19]] wherein the metal-containing film is a Group IVB, VB, or VIB metal alloy film.
33. **(Original)** A chemical vapor deposition system comprising:  
a deposition chamber having a semiconductor substrate or substrate assembly positioned therein;  
a vessel containing a precursor composition comprising one or more complexes of the formula:  
$$[(R^1)NC(R^2)C(R^3)N(R^4)]_xML_y$$
wherein:  
M is a Group IVB, VB, or VIB metal;  
each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> is independently H or an organic group;  
each L is independently CO, NO, CN, CS, CNR<sup>5</sup>, R<sup>6</sup>CN, or R<sup>7</sup>, wherein each R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> group is independently an organic group;  
x = 1 to 4; and

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y = 1 to 4.

34. (Original) The system of claim 33 wherein each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> is independently H or a (C<sub>1</sub>-C<sub>30</sub>)organic group.
35. (Original) The system of claim 33 wherein the complex is a monomer.
36. (Original) The system of claim 33 wherein each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> group is independently H or a (C<sub>1</sub>-C<sub>4</sub>)alkyl moiety.
37. (Original) The system of claim 33 wherein R<sup>7</sup> is cyclopentadienyl or a substituted cyclopentadienyl.
38. (Currently Amended) A chemical vapor deposition system comprising:  
a deposition chamber having a semiconductor substrate or substrate assembly positioned therein;  
a vessel containing a precursor composition comprising one or more liquid complexes of the formula:  
$$[(R^1)NC(R^2)C(R^3)N(R^4)]_xML_y$$
wherein:  
M is a Group IVB, VB, or VIB metal;  
each R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, and R<sup>4</sup> independently H or a (C<sub>1</sub>-C<sub>30</sub>)organic group;  
each L is independently CO, NO, CN, CS, CNR<sup>5</sup>, R<sup>6</sup>CN, or R<sup>7</sup>, wherein each R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> group is independently an organic group;  
x = 1 to 4; and  
y = 1 to 4.